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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
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LKG

Ms. Loretta Barsamian
Executive Officer
San Francisco Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

Dear Ms. Barsamian:

Thank you for the opportunity to review and comment on the San Francisco Bay mercury total maximum daily load (TMDL) project report dated June 6, 2003. We reviewed the proposed TMDLs and implementation provisions to determine whether they are consistent with applicable federal regulations concerning TMDLs and NPDES permitting. This letter provides summary comments; detailed comments and recommendations are provided in the enclosure.

We appreciate the Regional Board's hard work to develop the report. We fully recognize the complexity of mercury cycling in the Bay environment and difficulty of controlling sources of mercury loading to the Bay. EPA supports the basic conceptual model and analytical approach embraced in this TMDL report and we believe this approach provides a valid basis for completing the TMDLs.

We are concerned that in their current form, the TMDLs do not appear to meet all federal TMDL requirements. The implementation provisions addressing NPDES-permitted sources do not appear to be fully consistent with federal permitting requirements. It may be possible for the Regional Board to address some of these concerns by more clearly explaining the proposed decision and its analytical basis; however, some changes in the TMDL and implementation provisions appear necessary to ensure full compliance with federal regulatory requirements, as discussed below.

This letter recommends an approach to addressing our concerns regarding wasteload allocations (WLAs) and NPDES permitting. This approach would ensure compliance with the applicable numeric objectives in the short term while retaining the State's desired focus on long term mercury reductions. Our analysis of recent mercury effluent data for municipal wastewater discharges indicates that more than 90% of municipal discharges to the Bay comply with the recommended WLAs. Our review of data from several industrial dischargers and the TMDL's analysis of industrial discharges also indicates that nearly all industrial discharges would comply with the suggested WLA approach without having to upgrade treatment. Therefore, the suggested WLA and permitting approaches are not expected to result in required treatment upgrades for most municipal and industrial dischargers, but would ensure continued aggressive source control.

Concerns About TMDL Provisions

Elements of the proposed TMDL that do not appear to meet all federal regulatory requirements include:

1. **Compliance with Numeric Water Quality Standards**. The report does not sufficiently demonstrate that the TMDL would result in attainment of applicable water quality standards. With respect to numeric standards, the TMDL does not demonstrate how the numeric Basin Plan aquatic life objective or the numeric California Toxics Rule (CTR) human health criterion would be attained throughout the affected Bay segments. The CTR specifically provides that the standards are to be met throughout the receiving water unless mixing zones are allowed (which the State acknowledges is inappropriate for bioaccumulative toxic pollutants such as mercury). As the TMDL analysis describes, mercury discharges could be causing localized exceedances of water quality standards in the vicinity of discharge locations and other points in the Bay, even as the mercury standards are attained at a Bay-wide scale. This concern should be addressed by modifying the individual wasteload and load allocations to ensure attainment of the numeric water quality standards at the individual discharge locations around the Bay.

   The proposed 5-year averaging period also is inconsistent with the numeric objective and criterion, which provide for much shorter averaging periods, as well as NPDES regulations. This concern should be addressed by modifying the wasteload and load allocations to ensure attainment of the numeric objective and criterion throughout the Bay (and at discharge points in particular) and provide for shorter averaging periods consistent with the applicable numeric objective and criterion.

   Recommendation. A viable approach for addressing these temporal and spatial compliance concerns would be to set wasteload and load allocations on both a short-term and long-term basis. Wasteload allocations for NPDES discharges could be based on (1) current performance or (2) the locally applicable numeric water quality objective or criterion multiplied by facility flow, whichever is more stringent. Current performance could be defined both in the short term (95th percentile measured as monthly or weekly averages) and the long term (rolling annual average loads). Similarly, wasteload allocations based on applicable standards and facility flows could be expressed both in the short-term (the numeric objective or criterion multiplied by the 95th percentile of actual flows) and the long-term (the numeric objective multiplied by rolling average annual flows). Table 1 summarizes this recommended approach. This approach to setting wasteload allocations would have the advantage of addressing both the short term averaging requirements of the numeric water quality standards and the State's preference for focusing upon longer term averaging periods for evaluating mercury loadings. This approach also ensures that wasteload allocations do not result in localized exceedances of numeric standards while implementing the State's goal of requiring municipal treatment plant discharges and industrial facility dischargers to maintain, at a minimum, current performance levels.

Table 1: Recommended Approach for Setting Wasteload Allocations

Selected WLAs for each averaging period would be the more stringent of Option 1 or Option 2:	Option 1: Current Performance	Option 2: WLA Based on Numeric Objective	Comments
Short Term (monthly or weekly averaging period)	95th percentile of current discharge performance, expressed as mass	applicable numeric objective * 95th percentile of actual flow	accounts for short term averaging period and discharge variability
Long Term (rolling annual averaging period)	annual average discharge performance, as mass	applicable numeric objective * average facility flow	short term discharge variability not an issue due to long averaging period

An analogous approach is recommended for nonpoint source load allocations. Load allocations would be expressed on both a short-term and long-term basis, taking into account current estimates of loads and flows from different source categories. This approach to setting the load allocations would ensure compliance with the spatial and temporal elements of the numeric objective and criterion while supporting the State's goal of focusing upon long-term mercury reductions.

2. **Compliance with Narrative Water Quality Standards.** With respect to narrative water quality standards, we support the proposed use of numeric targets for mercury levels in sediment, fish tissue, and bird eggs, but are concerned that they may be not be set at levels that fully protect the uses of concern, including the aquatic life and wildlife designated uses. The report properly acknowledges a high level of uncertainty with respect to the sediment, fish tissue, and bird egg target levels needed to ensure protection of these uses. As discussed in detail in the enclosure, some available information suggests more stringent numeric targets for sediment, fish tissue, and bird eggs may be appropriate to ensure protection of these uses in light of these uncertainties.

   Recommendation. Upon consideration of the enclosed comments concerning alternative numeric targets, the State should consider modifying the numeric targets supporting the TMDL calculations, if warranted. If the State determines that the numeric targets need not be changed, the analysis supporting the numeric targets should be revised to provide a clearer and more persuasive rationale that the targets are protective of all designated uses.

3. **Individual Waste Load Allocations.** The report is unclear as to whether the State intends to formally adopt individual waste load allocations (WLAs) for individual industrial, municipal wastewater, and municipal stormwater permittees, as required by 40 CFR 130.2(h). Following discussions with your staff on August 11, 2003, we understand the Regional Board intends to adopt individual WLAs for these NPDES discharges.

   Recommendation. Our concern should be addressed by clarifying in the TMDL basin plan amendment the State's proposed decision to adopt the individual WLAs for each industrial, municipal wastewater, and municipal stormwater discharger.

4. **Potential Allowances for Growth in Point Source Discharges.** We understand the State intends to limit wasteload allocations for municipal and industrial wastewater discharges to current performance levels. EPA supports this approach and believes this is essential since the TMDL does not demonstrate that increased load can be assimilated nor does the TMDL assess the relative bioavailability of mercury from these sources. We also recommend that the State work with all dischargers to assure implementation of effective and aggressive mercury minimization practices. However, the proposed WLAs are based on the 95th percentile discharge levels, to account for short term variability in discharge levels. This approach appears to make sense in the short term, but not in the long term. Over a longer averaging period, facility discharge levels would converge toward the long-term average and short term effluent variability ceases to be a valid concern. As the proposed WLAs are based on a very long averaging period, setting the WLAs based on the 95th percentile would have the effect of actually permitting increases in long-term mercury loading in comparison with current average performance.

It would be inappropriate to authorize increases in mercury discharges from point sources until additional assimilative capacity has been created in the Bay. As mercury reductions are not expected for many years, it is unlikely additional assimilative capacity would become available in the foreseeable future. The proposed WLAs appears to conflict with federal regulatory requirements that provide for less stringent wasteload allocations only where nonpoint source controls are demonstrated to be practicable (40 CFR 130.2(i)). EPA policy and guidance provide that there should be reasonable assurances that nonpoint source controls will occur prior to allowing point source discharges to increase (see Guidance for Water Quality-based Decisions: The TMDL Process, EPA, 1991; "New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs)" EPA, 1997). The TMDL analysis does not yet demonstrate that the loading reductions needed to implement the load allocations are practicable or that they will be implemented prior to allowing increases in point source discharges.

Recommendation. The WLAs should be revised to ensure that no increases in point source loads are permitted over the long term in order to (1) carry out the State's goal of capping point source discharges from municipal and industrial wastewater facilities at current performance levels and (2) ensure compliance with the provisions of 40 CFR 130.2(i). As discussed in the WLA recommendations under comment 1 above, rolling annual averages should be used to calculate long term WLAs based on current performance. The State's proposed use of 95th percentile discharge levels would be appropriate for calculating short term WLAs.

5. **Insufficient Margin of Safety.** The report briefly discusses several substantial sources of uncertainty in the TMDL analysis but does not appear to provide a sufficient margin of safety to account for them, as required by 40 CFR 130.7(c)(1). For example, the TMDL analysis assumes that a linear relationship exists between water column, sediment, and fish tissue mercury levels, and relies upon this assumption in calculating the TMDLs. The analysis acknowledges the substantial uncertainty related to this assumption, yet the TMDLs do not provide a margin of safety to account for this source of uncertainty.

Recommendation. The State should provide a more detailed discussion of all important sources of analytical uncertainty and approaches taken to ensure an adequate implicit margin of safety to account for each of them. The State may also consider including an explicit margin of safety (perhaps 10-20%) in the TMDL to further account for the many significant sources of uncertainty in the analysis.

Concerns About NPDES Permitting Provisions

Elements of the proposed NPDES permitting implementation provisions that do not appear to meet federal regulatory requirements include:

1. **Absence of Required Water Quality Based Effluent Limitations (WQBELS)**. The TMDL implementation provisions do not yet require inclusion of WQBELs for mercury for NPDES permits and instead provide only for inclusion of triggers in lieu of WQBELs. This provision would conflict with 40 CFR 122.44 (d) which requires inclusion of WQBELs for pollutants that may cause or contribute to exceedances of applicable water quality standards, and 40 CFR 122.44(k)(3) which requires numeric WQBELs unless infeasible. Effluent limitations means any restriction on the quantity, discharge rate and concentration of a pollutant. See 40 CFR 122.2. The TMDL implementation as drafted is not consistent with applicable NPDES regulations and the Clean Water Act.

   Recommendation. This concern must be addressed. The implementation provision must clearly state that NPDES permits, which implement this TMDL, must contain WQBELs for mercury.

2. **Insufficient Assurance that Individual Discharges Will Not Cause Standards Exceedances**. As discussed above, the TMDLs and associated implementation provisions appear to allow point source discharges at levels that may violate applicable water quality standards near discharge points. This provision is inconsistent with 40 CFR 122.44(d)(1), which requires that permit limitations be set at levels that do not result in exceedances of water quality standards. EPA is concerned about this provision for two reasons. First, as discussed above, the TMDL analysis appears to rely in substantial part upon future decreases in mercury loads from non-NPDES sources to attain mercury standards in the Bay, but does not provide reasonable assurances that these reductions will actually occur. Second, the TMDLs may not be sufficient to result in attainment of applicable numeric water quality standards throughout the Bay, including at points near discharge outfalls.

   Recommendation. As discussed above, this concern would be addressed by setting both short term and long term WLAs and associated WQBELs at the more stringent of either 1) current performance or (2) the locally applicable numeric water quality objectives multiplied by facility flow.

3. **Averaging Period for Municipal and Industrial Dischargers is Too Long.** The proposed five-year averaging period for compliance is inconsistent with Federal permitting regulations

at 40 CFR 122.45(d), which require compliance with limits based on monthly, daily, and weekly time frames, unless impracticable. There is no discussion of why it is impracticable to use shorter, more protective averaging periods. There is also no discussion as to how such an averaging period will ensure compliance with the WLA nor the affect of the shorter term spikes that this very long averaging period will allow. Additionally, as discussed above, the five-year averaging period also appears to be inconsistent with the applicable numeric objective and criterion.

Recommendation. The implementation provisions should be revised to shorten the maximum averaging period for long term WQBELs. Consistent with the recommendation to set WLAs based on both long term rolling annual averages and short term weekly or monthly averages, the implementation plan should provide for establishment of WQBELs on the same basis.

In closing, we commend your staff for their hard work on this particularly difficult TMDL proposal. We are committed to working with the State to identify TMDL and implementation approaches that address our shared goals of accomplishing reductions of mercury levels in the Bay while ensuring that legal requirements are met. To this end, we would be happy to meet with you, your staff, and other stakeholders to explore alternatives for modifying the proposed TMDLs, allocations, and implementation provisions, in a way that is acceptable to all of us and is consistent with legal requirements. If you have questions concerning these comments, please call me at (415) 972-3572 or refer staff to Diane Fleck at (415) 972-3480 concerning TMDL comments or Nancy Yoshikawa at (415) 972-3535 concerning NPDES implementation comments.

Sincerely,

Alexis Strauss 8 September 2003

Alexis Strauss
Director
Water Division

enclosure

Enclosure:
Detailed Comments Concerning Proposed Mercury TMDLs and Implementation Provisions for San Francisco Bay

I. TMDL Comments

1. Numeric Targets

We have three general areas of concern: 1) numeric water quality standards are not included as numeric targets; 2) proposed numeric targets may not be sufficiently protective of beneficial uses; and 3) proposed numeric targets do not protect against localized or short-term water quality standards violations. We recommend inclusion as numeric targets:

- the Basin Plan aquatic life objective of 0.025 ug/l total mercury (total recoverable) and the California Toxics Rule (CTR) human health criterion of 0.051 ug/l total mercury (total recoverable),
- a sediment target of 0.13 ppm as an aquatic life and wildlife target,
- a revised bird egg concentration target based on a no observed effect level instead of the lowest observed effect level proposed in the TMDL analysis, and
- more stringent fish tissue targets for trophic level 4 fish to protect specific Federally listed threatened and endangered (T&E) species that live in and around San Francisco Bay.

The basis for these recommendations is provided below.

A. Numeric Water Quality Standards Should Be Included as Numeric Targets

The TMDL proposes numeric targets for fish tissue to meet human health beneficial uses, for bird eggs to meet wildlife beneficial uses, and for sediment which is the basis of the TMDL calculations. EPA supports the use of multiple numeric targets in various media to ensure attainment of water quality standards. However, the TMDL does not include current water quality standards which are expressed in water column concentration values as numeric targets. It is appropriate to include these numeric objectives as TMDL numeric targets because they directly express the applicable numeric water quality standards. Specifically, the TMDL should include water column numeric targets based on the aquatic life numeric objective of 0.025 ug/l of total mercury (total recoverable) in the Basin Plan which applies to portions of the Bay north of Dumbarton Bridge and the human health criterion of 0.051 ug/l total mercury (total recoverable) in the California Toxics Rule (CTR) which applies to the entire Bay.

B. Proposed Sediment Numeric Targets May Not Sufficiently Protect Beneficial Uses

The TMDL proposes a sediment target of 0.2 ppm of mercury (pages 32 -33) to protect all beneficial uses including human health and wildlife. The document asserts that if the sediment target of 0.2 ppm is reached, the State's recommended fish tissue target and bird egg target will also be achieved.

EPA's sediment quality guidelines recommend a Threshold Effects Level (TEL) of 0.13

mg/kg or ppm, which is the TEL associated with no observed effect on benthic organisms (as part of a study by Florida Dept. of Environmental Protection [MacDonald et al., 1996]). This TEL value is slightly lower than the NOAA Effects Range-Low value for mercury (ERL) which is 0.15 mg/kg dry or ppm. The TEL was used as the principal sediment numeric target for the Newport Bay mercury TMDLs established in 2002. We recommend that the State consider adopting a sediment numeric target of no greater than 0.13 ppm as an appropriate indicator of water quality to protect aquatic life and wildlife beneficial uses. If the State chooses not to adopt this more stringent target, the TMDL analysis should demonstrate more clearly why the proposed 0.2 mg/kg numeric target is protective of beneficial uses.

C. **Proposed Bird Egg Numeric Targets May Not Sufficiently Protect Beneficial Uses**
As noted above, the TMDL proposes a numeric target of 0.5 ug/g in bird eggs to protect wildlife. The document notes that this concentration has been associated with toxic effects (pages 30 - 31). However, if 0.5 ug/g has been associated with toxic effects, this value is not a sufficiently stringent numeric target to protect wildlife. We recommend that this lowest observed effects level, or LOEL, be translated into a no observed effects level or NOEL to ensure the protection of wildlife beneficial uses. EPA suggests that the Regional Board consult with the U.S. Fish and Wildlife Service for appropriate calculations for wildlife that reside on and in San Francisco Bay.

D. **Proposed Fish Tissue Numeric Targets May Not Sufficiently Protect Beneficial Uses**
As noted above, the TMDL proposes a numeric target of 0.2 mg/kg in fish tissue to protect human health. The U.S. Fish and Wildlife Service and EPA are currently completing a study of the effects of EPA's CWA 304(a) human health fish tissue criterion guidance value on Federally listed threatened and endangered (T&E) species in California.[1] Preliminary results from this study suggest that the fish tissue target proposed for the TMDL may not be protective of the most sensitive T&E species addressed in the study, the California least tern. This species lives in the Bay area. Preliminary calculations indicate that tissue levels of approximately 0.12 mg/kg in trophic level 4 fish may be necessary to protect this species. We will follow up with your staff to share these preliminary study results. Because the proposed fish tissue target of 0.2 mg/kg may not be protective of T&E wildlife in the Bay area, EPA recommends that the State consider a 0.12 mg/kg fish tissue target in trophic level 4 fish to protect specific federally listed threatened and endangered (T&E) species that live in and around San Francisco Bay.

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[1] This document is currently in draft form; it may be cited as follows: U.S. Fish and Wildlife Service, 2003. Evaluation of the Clean Water Act Section 304(a) Human Health Criterion for Methylmercury; Protectiveness for Threatened and Endangered Wildlife in California. DRAFT Document prepared for the U.S. Environmental Protection Agency under Inter-Agency Agreement No. DW-14-95556801-0. U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Division of Environmental Contaminants, Sacramento, California. 90 pp + appendix.

E. Frequency of Allowable Exceedances May Conflict With Numeric Standards

A sediment target of 0.2 ppm for mercury is used as the principal basis for the TMDL calculations throughout the analysis. The analysis is based on the assumption that a one-to-one relationship exists between media: that a percentage reduction of mercury in sediment will result in the same percentage reduction in other media, i.e., bird eggs and fish tissue, for wildlife and human health beneficial uses, respectively. The document states that "A sediment mercury target is preferable to a water column mercury target because sediment mercury concentrations relate better to the amount of mercury in the bay and are less subject to short-term fluctuations." (page 31). We recognize that sediment mercury concentrations may relate better to the total amount of mercury in the Bay and understand the State's preference for adopting a focus on long term reductions in mercury levels in the Bay. We are concerned that the analysis appears to essentially ignore the potential for frequent exceedances of the applicable numeric water quality standards.

The TMDL must ensure that all currently applicable water quality standards are met. The Basin Plan's existing aquatic life numeric water quality objective applicable to most of the Bay of 0.025 ug/l is expressed as a 4 day average. Aquatic life standards for toxic pollutants are generally applied with an allowable exceedance frequency of no greater than once in any three year period (see 40 CFR 131.36(c)(2) at Table 4 Notes 1 and 2, 40 CFR 131.38(c)(2), and Technical Support Document for Water Quality-based Toxics Control, EPA 1991). The applicable numeric criterion applicable to the rest of the Bay is the CTR human health water quality criterion of 0.050 ug/l. Human health water quality criteria are generally applied with allowable exceedance durations and frequencies that vary depending upon the potential health effects associated with individual toxicants. To implement human health criteria for toxic pollutants through NPDES permits, EPA recommends use of monthly permit averaging periods and daily or weekly maximums (Technical Support Document for Water Quality-based Toxics Control, EPA 1991). Because it appears appropriate to provide for both short and long term compliance timeframes, we recommend use of rolling 12 month annual averages to assess long term compliance; and monthly and/or weekly averaging periods to account for shorter term fluctuations and ensure compliance with applicable numeric standards.

The analysis states that the proposed sediment target is "consistent with" the Basin Plan objective and the CTR criterion (page 33), because if the sediment target were achieved, and water column exceedances were cut in half, then only about 10% of the samples taken over the past 8 year period (or about 46 samples of 465) would exceed the 0.025 ug/l Basin Plan objective for aquatic life. This expected exceedance frequency appears to be inconsistent with provisions that aquatic life standards may be exceeded no more than once in three years. In light of these considerations, it is important that the TMDL analysis more fully consider the potential for short term exceedances of water column numeric objectives and more clearly support its conclusion that the TMDLs will result in attainment of the numeric standards.

F. TMDLs May Not Result In Attainment of Applicable Standards Throughout The Bay

We are concerned that the TMDL may not protect against localized exceedances of

applicable water quality standards that may be significant in terms of ecological impacts. The TMDL document acknowledges the potential that localized near-field effects of mercury discharges may be significant at some locations in the Bay. The document cites a recent study that suggests that the input of wastewater into the southern portions of the Bay could be an important contributor to mercury methylation through the supply of organic carbon and nutrients. There is also some evidence that wastewater from point sources often contains a relatively higher fraction of dissolved mercury and methylmercury that could be more bioavailable than mercury loads from nonpoint sources that contain a higher fraction of particle-bound mercury. Recent studies indicate that "new" sources of mercury are methylated and taken up into the food chain before "old" sources of mercury, i.e., for San Francisco Bay, newly discharged mercury in wastewater is methylated before old mercury in sediment deposited during the Gold Rush era. Additionally, wastewater from point sources is often discharged into the shallow water fringes of the Bay, which are known to be more prone to methylation than deeper waters, and thus, uptake into the food chain occurs more rapidly. Point source discharges by their nature may create "hot spots" where observed elevated concentrations have potential impact on aquatic life, wildlife and human health. Consequently, equally comparing contributions from sediment and other sources potentially conceals the localized impact of mercury from point source dischargers.

Moreover, the TMDL analysis appears to treat the Bay as a well mixed system in which it is possible to conclude that water quality standards will be implemented in all locations if they are implemented on average. This approach appears to be inconsistent with the provisions of the CTR, which requires attainment of water quality standards at all points in the water body, including the point of discharge (40 CFR 131.38(c)(2)(i)); 2).[2]

A viable approach for addressing these temporal and spatial compliance concerns would be to set wasteload allocations for NPDES discharges based on (1) current performance or (2) the locally applicable numeric water quality objective or criterion multiplied by facility flow, whichever is more stringent. Current performance could be defined both in the short term (95^{th} percentile loads or other appropriate statistically-derived load amount measured as monthly or weekly averages) and the long term (rolling annual average loads). Similarly, allocations based on applicable standards and facility flows could be expressed both in the short term (the numeric objective or criterion multiplied by actual flow) and the long term (the numeric objective or criterion multiplied by rolling average annual flows).

To help determine whether this recommended approach is workable for point source dischargers, EPA analyzed the Regional Board's analysis of effluent data collected using ultra clean collection methods from 24 representative POTWs (Katen, 2001). Our analysis found that only 2 of 24 dischargers do not currently meet the applicable numeric water

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[2] This CTR requirement applies in the absence of approved mixing zones for the pollutant in question. EPA guidance and California's State Implementation Plan strongly discourage the use of mixing zones for bioaccumulative toxicants such as mercury. We assume that mixing zones will not be allowed for mercury in San Francisco Bay, and that the applicable water quality standards need to be met throughout the Bay as a result.

quality objective or criterion at the discharge points when their discharge results are averaged over the long term as recommended in these comments. It appears that all of the discharges would meet the recommended short term WLA based on the 95th percentile discharge results. The TMDL analysis indicates that mercury loads from the POTWs are substantially higher than mercury loads from industrial dischargers; therefore, it appears that most if not all industrial dischargers would also comply with the recommended WLAs. We evaluated recent effluent data from 5 industrial dischargers and found that on average, industrial dischargers meet the applicable numeric standards. This preliminary analysis of effluent data suggests that adoption of the recommended approach to setting WLAs would necessitate no treatment upgrades by almost all dischargers.

An analogous load allocation approach is recommended for nonpoint source load allocations. Load allocations would be expressed on both a short term and long term basis, taking into account current estimates of loads and flows from different source categories. Setting wasteload and load allocations on this basis would balance the State's goal of focusing upon long term attainment of mercury standards in the Bay as a whole with the legal requirement to address the temporal and spatial components of the applicable numeric objectives.

2. TMDL Allocations

A. Individual Waste Load Allocations Are Required for Publically Owned Treatment Works, Individual Industrial Discharges, and Individual Stormwater Permits

The proposed TMDL document is unclear as to whether individual waste load allocations (WLAs) will be formally adopted by the State as part of the TMDL decision. We now understand from your staff that you intend to propose adoption of individual WLAs for individual POTWs, industrial dischargers, and stormwater permit holders. Adoption of individual WLAs for these dischargers would be consistent with the requirements of 40 CFR 130.2(h), which requires individual wasteload allocations for individual NPDES permits.

B. Allowances for Growth in Point Sources Prior to Nonpoint Source Reductions

The TMDL analysis appears to provide waste load allocations for point sources that, when considered as a group, would authorize increases in loads in comparison to current average mercury discharge levels. This approach appears to conflict with the Regional Board's goal of capping point source discharge levels at current performance levels. This provision also appears to conflict with Federal regulatory requirements that provide for less stringent wasteload allocations only where nonpoint source controls needed to implement load allocations are demonstrated to be practicable (40 CFR 130.2(i)). EPA policy and guidance provide that there should be reasonable assurances that nonpoint source controls will occur prior to allowing point source discharges to increase (see Guidance for Water Quality-based Decisions: The TMDL Process, EPA, 1991; "New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs)" EPA, 1997). The mercury TMDL analysis does not demonstrate that the loading reductions needed to implement the load allocations are practicable or that they will be implemented prior to allowing increases in

point source discharges.

The proposed grouped mass-based WLAs for municipal and industrial dischargers is based on "current" loadings. The definition of "current loadings" is found in a staff memo dated May 20, 2003 entitled "Current Mercury Wastewater Loading to San Francisco Bay" by Richard Looker. It states that "we [the Regional Board] define current loading as the 95th percentile loading" for purposes of the SF Bay Mercury TMDL. The document estimates a 95% loading to ensure that "the yearly loading estimate reflects the range of variability both in effluent mercury concentration and volumetric flow rate of wastewater effluent." The estimated average annual loading (over a 2 and 3/4 year period from January 2000 to September 2002) for municipal facilities is 12.6 kg/year and for refineries and industrial facilities is 1.16 kg/year. The estimated standard deviation is 2.7 kg/year for municipals and 0.58 kg/year for industrials, and the computed 95th percentile is estimated to be 17 kg/year for municipals and 2.1 kg/year for industrials, the grouped mass-based WLA for each category of discharger, respectively.

No other LA or WLA is given a 95% confidence interval to account for variability. We understand the desire to account for short term effluent variability, but the report provides no reasonable justification is providing this leeway on a long term basis. Because the proposed WLAs are based on a very long averaging period, setting the WLAs based on the 95th percentile would have the effect of actually permitting increases in long term mercury loading in comparison with current average performance. The 95% confidence interval allows for a 35% increase from actual averages for municipalities (from the average annual loading of 12.6 to 17 kg/year), and an 81% increase for industrial dischargers (from 1.16 to 2.1 kg/year). We recommend, at a minimum, that WLAs for municipal and industrial dischargers be set at the more stringent of either (1) the water quality objective multiplied by the current facility flow or (2) existing average performance level. Based on our review of a recent analysis of effluent data, it appears nearly all of the point source discharges currently meet the numeric objective. For most facilities, therefore, the WLAs would be based on current performance. This approach to setting individual WLAs appears reasonable to implement.

C. A Rationale for Not Expressing Allocations As Daily Loads Is Needed

EPA agrees that loads do not need to be expressed as daily loads if there are technical reasons why another time period is more appropriate; however, no explanation is given in this TMDL as to why the loads were not calculated as daily loads. The Regional Board should clarify why daily loads are not calculated and why the alternative approach proposed is appropriate.

D. The Analysis Provides No Reasonable Assurances that the Load Allocations (LA) for Guadalupe River is Practicable or Will Be Implemented

The reductions expected from the Guadalupe River are significant (> 95%): from a current load estimate of 92 kg/year of mercury to a load allocation of 2 kg/year of mercury within 10 years. No explanation of how this LA will be achieved is discussed in the Allocations

chapter, Chapter 7. A brief discussion of the on-going TMDL for Guadalupe River is discussed in the Implementation chapter, Chapter 8. This discussion lists several measures that are "likely" to occur, and suggests that these measures will be phased in over time, thus necessitating the 10 year milestone for implementation of the allocation. Since the Guadalupe River TMDL is currently in its beginning phases (problem and source identification), the discussion in Chapter 8 contains significant uncertainty as to whether the measures listed will be implemented or will achieve the significant sediment reductions (and thus mercury reductions) projected by this load allocation. The TMDL analysis should clarify the basis for its apparent conclusion that this load allocation is practicable and will be implemented.

E. Several Sources Are Not Accounted For In the Allocations

The document at page 44 states that "recent studies underscore the need to consider all sources to be potentially important, even if they are relatively small compared to other sources and the amount of mercury already in the bay." However, some sources, specifically local mines and industrial and military sites along the bay margins, are not given allocations or otherwise accounted for in the TMDLs. EPA recommends that the RB include a reserve allocation to account for these sources or an explicit margin of safety to account for unknown sources along with other sources of uncertainty.

3. Margin of Safety

The TMDL report does not fully discuss the uncertainty associated with either the nature of mercury or with the various calculations within the TMDL analysis. Uncertainty associated with the nature of mercury is illustrated by the analyses' assumption that mercury in sediment has a one-to-one relationship with mercury in other media (fish tissue, bird eggs, and water column). How mercury bioaccumulates and changes forms between and within various media is not completely understood. It is not clear that the assumed one-to-one relationship in mercury levels among different media is environmentally conservative. Uncertainty associated with the various calculations within the TMDL analysis is illustrated by the calculations for most source loads and LAs/WLAs. Most of these calculations assume midpoints or averages taken from large ranges of estimates, implicitly building significant uncertainty into the final values.

At the end of Chapter 7, Allocations, the document discusses the Margin of Safety (MOS) for the TMDL. It states that the MOS is implicit in assumptions made within the TMDL analysis, and that assumptions used are more likely to be over-protective than under-protective. However, the assumptions discussed are not over-protective, and thus do not provide an implicit MOS. The specific assumptions are discussed below:

1) The document states that because local fish consumption data, as opposed to EPA's national average consumption rate of 17.5 g/day, are used to derive a fish tissue target of 0.2 mg/kg a conservative assumption was made which provides an implicit MOS. This assumption appears to reflect the use of the best available local consumption data but and thereby reduces the level of uncertainty with regard to this factor; however, in light of concern discussed above that the proposed fish tissue target may not be protective of

wildlife, this may not be a fully conservative assumption.

2) The document states that by using EPA's method to calculate a human health criterion in fish tissue, that conservative assumptions were used. The document states that since EPA's methodology uses a safety factor of 10 in its reference dose, that this incorporates conservative assumptions for this TMDL. This safety factor is used in all references doses for all pollutants; it represents the uncertainty of risk in all human health criteria guidance. It does not represent a conservative assumption that shows that this particular TMDL has used conservative assumptions.

3) The document states that EPA has calculated a wildlife criterion for mercury in fish tissue of 0.077 ppm for small fish and 0.35 ppm for larger predatory fish, and that the TMDL's human health target of 0.2 ppm in fish tissue is on the same order of magnitude. Being within the same order of magnitude, in this case within the range, is not conservative. In addition, the values are taken out of context from the cite (EPA's Report to Congress Volume VI, Section 5.4.6). The actual text in the Report reads "Using the recommended BAFs presented in Table 5-1, a wildlife criterion of 50 pg/l corresponds to a methyl mercury concentration in fish of 0.077 ug/g and 0.346 ug/g for trophic levels 3 and 4, respectively." These calculated values depend on a set of assumed BAFs (which may or may not apply to San Francisco Bay), and the values were never intended to be wildlife criteria values. They are simply fish tissue values that one would get when the water-based criterion value of 50 pg/l is multiplied by mean BAFs which were based in turn upon a survey of applicable field data.

The TMDL analysis does not sufficiently discuss analytical uncertainties associated with several other key elements including:

- analysis of background loading levels,
- assumption that meeting the water quality standards in the Bay as a whole will result in attainment throughout the Bay,
- assumption that meeting the standards over the long term will not result in short term exceedances,
- identification of other sources that are not accounted for in allocations, and
- assumption that Bay erosion will reduce loads by certain amounts over the long term.

We understand how difficult it was to develop the proposed TMDLs based on available data and resources, and we continue to support the basic analytical methods used by the State. However, it is appropriate to provide a larger and clearer margin of safety to account for the many uncertainties that attend this approach. The State should consider two approaches to better account for uncertainty in the TMDLs:

(1) Provide an explicit margin of safety of 10-20%. Provision of an explicit margin of safety in the form of a reserved unallocated portion of estimated assimilative capacity provides a direct mechanism for helping to ensure that the TMDL is more environmentally conservative in light of existing analytical uncertainties, and/or

(2) Provide more detailed discussions of each significant source of uncertainty in the analysis and the approaches taken in the TMDL analysis to account for that uncertainty (e.g., environmentally conservative assumptions).

II. Implementation Plan Comments

We are concerned that: 1) pollution prevention and BMPs are not required for each discharger and are not shown to result in compliance with the WLAs; and 2) the averaging period for determining compliance with WLAs is too long to ensure consistent attainment with existing water quality standards. We strongly recommend that: 1) pollution prevention plans and BMPs that will result in compliance with WLAs be identified; 2) the averaging periods of the WQBELs be consistent with current regulations regarding water quality standards, i.e., that monthly and/or weekly averages be used to evaluate short term, localized effects to protect aquatic life, human health and wildlife beneficial uses and to ensure compliance with existing water quality standards; and 3) that WLAs and associated pollution prevention plans and BMPs be required to be implemented through NPDES permits. As discussed above, WQBELs must be included in all NPDES permits.

A. Water Quality Based Effluent Limitations Must Be Included in NPDES Permits

NPDES regulations say that NPDES permits must contain water quality based effluent limitations or WQBELs for any pollutant that has the potential to cause or contribute to a water quality exceedance (40 CFR 122.44(d)(1)(i)). San Francisco Bay is not in attainment of its mercury water quality standards and is not expected to attain standards for several decades; discharges of mercury to the Bay have the potential to cause or contribute to a water quality exceedance for mercury. Therefore, point source discharges of mercury to the Bay regulated through NPDES permits must have WQBELs. The implementation plan does not appear to contemplate WQBELs for NPDES dischargers. The document suggests that for municipal and industrial dischargers, triggers be included in permits, to "ensure that POTWs [and industrial facilities] continue to operate at a high performance level of and that sensible pollution prevention and source control efforts are maintained..." at pages 62 and 63. Including triggers in lieu of WQBELs in NPDES permits is not consistent with existing NPDES regulations, and would be subject to EPA disapproval action under our NPDES oversight authority.

40 CFR 130.2(h) states that WLAs constitute a type of WQBEL. As discussed above, we recommend that the Regional Board include, for municipal and industrial dischargers, individual mass-based WLAs based on current water quality standards and current performance. These WLAs can easily be incorporated as WQBELs into NPDES permits. As discussed above, for urban storm water runoff discharges, we recommend the individual mass-based WLAs included at page 46 of the analysis be adopted.

B. Pollution Prevention Plans Should be Required in NPDES Permits

The document at pages 62 and 63 proposes pollution prevention measures be evaluated in NPDES permitted facilities if and when a municipal or industrial wastewater source exceeds

prescribed triggers which are set in water column concentrations. It is not clear from the document whether pollution prevention plans (source control programs) will be required only after triggers are exceeded or whether the Regional Board strongly encourages or merely proposes that they be incorporated into all NPDES permits. This point should be clarified. As discussed above, triggers are not a valid substitute for WQBELs.

Pollution prevention and control strategies should be the fundamental means for point sources to meet the WLAs and prevent increases in their discharges, and, thus, must be included in all NPDES permits. We note that the TMDL exempts municipal and industrial dischargers from reducing loads of mercury to the Bay because it might cause excessive cost (page 47, citing LWA 2000). EPA believes, as a matter of policy, that point sources that can reduce their mercury discharges in a cost-effective way should do so. The mere fact that other sources are currently the dominant cause of impairment should not excuse point sources from implementing feasible pollution prevention measures to reduce their contribution of mercury, however small, to the environment. Sources that implement pollution prevention plans frequently remove from the environment considerably more of the pollutant than can be accomplished through treatment. This is because less of the pollutant is generated in the first place; except when the pollutant can be completely destroyed (e.g., by changing its molecular structure), treatment solutions usually result in simply transferring the pollutant from one medium to another (e.g., from water to air or land). We are aware that well run municipal facilities can remove up to 90% of their influent mercury; however, much of that mercury ends up in sludge which in many cases is land applied or incinerated, and thus is simply transferred into a different media. The mercury is still a problem and has not been removed from the environment. Control programs aimed at eliminating sources and uses of mercury (which is a goal of the CWA) can require removal of mercury prior to treatment at the municipal facility, which results in true removal of mercury from the environment. This requires proper reuse and disposal at the source, removing and reducing loads to the environment through all routes of exposure.

For the reasons stated above, EPA recommends that pollution prevention plans be required for all NPDES permitted facilities, not just ones exceeding a trigger, and not just on a voluntary basis.

C. Averaging Period for Municipal and Industrial Dischargers is Too Long

The document at page 62 and 63 for municipal and industrial dischargers, respectively, recommends a five year averaging period for evaluating whether the grouped mass based WLAs are in compliance. A five-year averaging period is too long for municipal and industrial wastewater WLAs, and would be inconsistent with the intent of the permitting regulations, which require compliance with limits based on monthly, daily, and weekly time frames. Although the permit cycle is 5 years, WQBELs must assure compliance with water quality standards, both on a short term and long term basis. While a five year averaging period may be appropriate to evaluate long term effects of implementation of the LAs and WLAs, it is not effective for ensuring against localized short-term effects. It allows too much variability over too long a time frame. The averaging period of the WLAs must be consistent with current regulations regarding water quality standards. We suggest a twelve-

month moving average to evaluate long term effects, and, at a minimum, weekly and/or monthly averages to evaluate short term, localized, near field effects to protect aquatic life, human health, and wildlife beneficial uses, and to ensure compliance with existing water quality standards.

III. Other Comments

A. Model Comments

The box model used to show attainment of water quality standards over approximately 120 years is not ground-truthed with past data to assure its credibility. The basis of the model is that large amounts of sediment are continually flushing out of the Bay under the Golden Gate Bridge to the Pacific Ocean, and that as contaminated sediment (from the Gold Rush era) is flushed out of the "box", water quality will improve. However, even though contaminated sediment has been (theoretically) already escaping under the Golden Gate, water quality has not changed appreciably. We have not seen the water in the Bay improve as a result of the flushing out of contaminated sediment under the Golden Gate. It does not make clear sense that now this would change as a result of the TMDL. This model should be ground-truthed, i.e., extrapolated from time zero (now) using recent past data, in order check its reliability and thus assure us that the model is in fact a credible model upon which to base this important TMDL.

It appears that as sediment is flushed out under the Golden Gate, more contaminated sediment may be exposed, based on the core samples at page 15. If so, water quality in the Bay may tend to get worse, rather than better, in the near term, from this source as the more contaminated sediment is exposed until it is completely flushed out. The model needs to be ground-truthed with past data in order to be credible.

The one-box model is a very simple mass-balance approach to the TMDL that may be reasonable given the large uncertainties and lack of data presently available. However, the life of the TMDL is projected to be approximately 120 years, during which there will be ample chances to supplement available data in order to address some of the model's uncertainties and revisit the model's results. We believe that a clear plan with specific time frames to monitor and verify values for the main sources and losses used in the model should be included, to gather appropriate data for re-running and verifying results, or changing results and modifying the TMDL as appropriate.

Specifically, we are concerned that the model's current inputs may overestimate sediment as a mercury source, underestimate wastewater as a mercury source (previously discussed), and underestimate mercury losses from dredging. We are also concerned with the uncertainty associated with losses through the Golden Gate, and the dependence of this value to drive the results of the model.

B. Sediment As a Mercury Source

We are concerned that existing sediment as a source may be overestimated. The mass of

mercury in the "active layer" subject to continuous resuspension ("bed erosion" in the TMDL document) is assumed to be completely available for methylation and/or food web uptake. This appears to be a questionable assumption. RMP data included in the TMDL document at pages 32 and 33 show that even though the overall ambient sediment concentration of mercury is about 0.4 ppm, 0.3 ppm of the (about 75% of the total) remains particle-bound. The dissolved portion, which should be substantially more available (at least initially) for methylation and uptake, is only about 25% of the total sediment concentration. It is true that, when particles with their associated mercury load settle in depositional locations, they may become more subject to methylation (especially those that become buried a few centimeters deep near the redox discontinuity). But this is a surface area issue, as opposed to a sediment volume (total mass of mercury) issue. Where sediment deposition is active, much of the mass of sediment, with its associated mercury, will be buried sufficiently so that methylation potential is relatively low compared to the more surficial sediments (let alone as compared to the dissolved fraction or to the mercury from other more traditional "new" sources such as municipal or industrial wastewater discharges). In the meantime, all remaining sediment in the "active layer" will generally be oxic and much less susceptible to methylation and uptake than the mercury from other "new" sources.

Although the one-box model may overestimate the degree to which existing sediments in the Bay are really a "source", the approach taken does reflect a worse-case (conservative) approach. Given the "life" of the TMDL, 120 years, there is ample opportunity to monitor this input and revisit the model in the future as appropriate. This is important because a known overestimate of sediments as a source should not be an acceptable long-term basis for allowing other controllable sources to not reduce their discharges of mercury as much as possible. Another way of approaching this now would be to apply a "weighting factor" to the sediment source that is less than that applied to other "new" sources for use in the one-box model approach.

C. Dredging and Mercury Loss From the System

We are concerned that dredging as a loss of mercury both in the near future and in the long-run, is underestimated. Much more than 700,000 cy per year (see Table 4.5) is removed from the Bay each year via dredging, and in future years the volume will increase. The 700,000 cy figure only reflects the maintenance-dredged material (of essentially "ambient" mercury concentrations) from two federal channels that is routinely disposed at the San Francisco Deep Ocean Disposal Site (SF-DODS). It does not include other material that goes to the beneficial re-use sites (levee restoration at Winter Island; wetland restoration sites, e.g., Sonoma Baylands, Montezuma Wetlands, and Hamilton; habitat creation at Oakland Middle Harbor; or other in-filling projects) that isolate the vast majority of the dredged material from the aquatic environment. Neither does it reflect the in-place LTMS Management Plan that calls for an additional ~50% overall reduction in allowable in-Bay disposal volumes (currently about 3 million cy per year, dropping over the next 9 years to a maximum of 1.5 million cy). The other 1.5 million cy per year will be removed from the Bay and will instead go to the SF-DODS and to upland disposal/beneficial re-use. Finally, it does not account for the more highly contaminated sediment that is dredged, but that fail the in-Bay disposal tests. All of this material is removed from the Bay. In general, these

sediments represent a greater proportional mass of mercury (and other contaminants) compared to the ambient concentration that the model calculations assume.

The relative size of this factor is easily tracked and verified through dredging records. The TMDL should require this factor to be more closely tracked and revised accordingly when the model is updated and the TMDL revised.

D. Uncertainty of Losses Through the Golden Gate

Although we do not have better information than that used in the TMDL analysis to estimate losses through the Golden Gate, the magnitude of this factor in the box-model analysis is critical to the TMDL's conclusion that natural attenuation will significantly improve the water quality in the Bay. Since this is such an important factor, the TMDL should include a clear plan to monitor this factor, and verify or revisit the model in the future based on new data. We believe it is technically feasible to institute a reasonable cost monitoring program to at least confirm whether the model's assumptions for this factor are within a reasonable range of that used. Monitoring this factor would also benefit other TMDLs for San Francisco Bay for sediment-associated pollutants.

E. Model Results

We believe that the model results would be quite different using the different source and loss inputs for sediment and dredging as described above. The shape of the curves in Figure 7.2 would be different: a greater dredging loss value would result in a steeper set of curves, while a small sediment source value would lower the initial height of the curves. Together, these would tend to accelerate the projected date that the Bay would attain water quality standards.